Addendum to manual

PLN-24CH12 / PRS-48CH12

Bosch Security Systems B.V.
PO Box 80002
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The Netherlands
www.boschsecurity.com
22. August 2016

1 General

This addendum to the manual of the PLN-24CH12 and PRS-48CH12 chargers contains important information for proper installation and operation.

2 R_i-monitoring

The PLN-24CH12 and PRS-48CH12 battery chargers have built-in R_i monitoring. This is important and mandatory for compliance to EN54-4. It means that the charger monitors the summed resistance of the wiring, fuse, electrical connections and the R_i of the battery. It warns the user when the battery has aged and must be replaced. The R_i supervision threshold has been selected such that when the R_i of the battery has increased to the maximum allowed value the backup power system can still power the VACIE.

Because the resistance of the wiring and the connections is incorporated into the measured R_i, it is important that these resistances are very low, otherwise even good batteries will generate a fault. This makes sense because a VACIE can take up to 150 A from the battery and then every 10 mohm will already cause a voltage drop of 1.5 V, limiting the maximum available output power from the VACIE.

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3 Wire gauge selection

As installer, you should take into consideration all major contributors to the total resistance, being:

- Battery R_i – typically 2 to 6 mohm per battery, depending on size and make.
- Cables – very dependent on length and gauge.
- Battery fuse – typically 1 to 2 mohms.
- Connections – typically 1 mohm.

The actual values need to be checked with the battery supplier and fuse supplier. Also be aware of possible influences of connections, e.g. pay attention to screw-tightening of connections.

Keep some margin to avoid false positive faults. Stay at least 20% below the selected R_i-limit, because there is some tolerance on the measurement accuracy.
To help you selecting the right cable gauge, two tables are provided with maximum cable lengths per wire gauge for a number of battery types. Use this guideline to determine the needed gauge.

The first table is for 24 V battery systems and the second table is for 48V battery systems. The maximum length is given in cm and depicts the total cable length, i.e. all the wire length from charger to battery, the bridges to connect the batteries in series and the length back to the charger. Five different cable gauges are shown with cross-sectional areas of 6 mm^2 to 35 mm^2. Then two different jumper settings can be selected for the threshold of the R_i-supervision of the charger, the setting ‘50’ is intended for loads up to 100 A, the setting ‘75’ for loads up to 150 A.
Allow for up to 5 hours for the unit to report a battery fault.

In some cases the maximum resistance is already exceeded, even for zero length cables. This is not allowed and indicated as n.a. (not allowed).

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Maximum total cable length to battery and return (cm)

24V		Cable gauge	16 mm²		25 mm²		35 mm²		50 mm²	
		Jumper setting	50	75	50	75	50	75	50	75
C20	Brand	Type	100A	150A	100A	150A	100A	150A	100A	150A
70 Ah	Yuasa	NPL78-12IFR	289	n.a.	451	n.a	632	n.a.	903	n.a
80 Ah	Effekta	BTL12-80	244	n.a.	382	n.a	535	n.a.	764	n.a
80 Ah	Fiamm	FG28009	431	n.a.	674	n.a	943	n.a.	1347	n.a
75 Ah	Sun	SB12-75FT	289	n.a.	451	n.a	632	n.a.	903	n.a
80 Ah	Long	6FM80G/B	200	n.a.	313	n.a	438	n.a.	625	n.a
90 Ah	Effekta	BTL12-90	271	0	424	0	593	0	847	0
90 Ah	Enersys	12VE90	329	0	514	76	719	107	1028	153
90 Ah	Sun	SB12-90FT	333	53	521	83	729	117	1042	167
100 Ah	Effekta	BTL12-100	289	0	451	0	632	0	903	0
100 Ah	Fiamm	FG2A007	458	178	715	278	1001	389	1431	556
100 Ah	PowerSonic	PS121000GB	298	0	465	0	651	0	931	56
100 Ah	Yuasa	NPL100-12	378	98	590	153	826	214	1181	306
105 Ah	Long	6FM100G/B	289	0	451	0	632	0	903	0
110 Ah	Sun	SB12-100HFT	351	71	549	111	768	156	1097	222
110 Ah	Sun	SB12-105FT	351	71	549	111	768	156	1097	222
120 Ah	Effekta	BTL12-120	378	98	590	153	826	214	1181	306
120 Ah	Fiamm	FG2C007	502	222	785	347	1099	486	1569	694
115 Ah	Long	6FM115G/B	289	0	451	0	632	0	903	0
120 Ah	Long	6FM120G/B	378	98	590	153	826	214	1181	306
125 Ah	Sun	SB12-125FT	449	169	701	264	982	369	1403	528
140 Ah	Enersys	6VE140	476	199	749	311	1048	436	1497	622
140 Ah	PBQ	FA140-12	378	98	590	153	826	214	1181	306
130 Ah	Yuasa	NPL130-6IFR	289	0	451	0	632	0	903	0
150 Ah	Effekta	BTL12-150	378	98	590	153	826	214	1181	306
150 Ah	Fiamm	FG2F009	547	267	854	417	1196	583	1708	833
150 Ah	Sun	SB12-150FT	467	187	729	292	1021	408	1458	583
155 Ah	Cell Power	CPF155-12	467	187	729	292	1021	408	1458	583
160 Ah	Haze	HZB12-160	555	275	868	430	1215	603	1736	861
180 Ah	Enersys	6VE180	518	238	810	372	1134	521	1619	744
180 Ah	Sun	SB12-180FT	476	196	743	306	1040	428	1486	611
200 Ah	Effekta	BTL12-200	378	98	590	153	826	214	1181	306
200 Ah	Fiamm	FG2M009	591	311	924	486	1293	681	1847	972
200 Ah	Yuasa	NPL200-6	502	222	785	347	1099	486	1569	694
210 Ah	Long	6FM200G/B	467	187	729	292	1021	408	1458	583
225 Ah	Enersys	2VE225	525	245	821	383	1149	537	1642	767

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Maximum total cable length to battery and return (cm)

48V		Cable gauge	16 mm²		25 mm²		30 mm²		50 mm²	
		Jumper setting	50	75	50	75	50	75	50	75
C20	Brand	Type	100A	150A	100A	150A	100A	150A	100A	150A
65 Ah	ABT	TM12-310W	460	n.a.	718	n.a.	1005	n.a.	1436	n.a.
65 Ah	Effekta	BTL12-65	467	n.a.	729	n.a.	1021	n.a.	1458	n.a.
65 Ah	Fiamm	FG26505	911	n.a.	1424	n.a.	1993	n.a.	2847	n.a.
65 Ah	Fiamm	FG26507	911	n.a.	1424	n.a.	1993	n.a.	2847	n.a.
65 Ah	PowerSonic	PS12650GB	236	n.a.	368	n.a.	515	n.a.	736	n.a.
65 Ah	Yuasa	NP65-12	556	n.a.	868	n.a.	1215	n.a.	1736	n.a.
68 Ah	Long	6FM65G/B	289	n.a.	451	n.a.	632	n.a.	903	n.a.
70 Ah	ABT	TM12-320W	748	n.a.	1168	n.a.	1635	n.a.	2336	n.a.
70 Ah	Fiamm	FG27004	627	n.a.	979	n.a.	1371	n.a.	1958	n.a.
70 Ah	Fiamm	FG27007	893	n.a.	1396	n.a.	1954	n.a.	2792	n.a.
73 Ah	Long	6FM70G/B	467	n.a.	729	n.a.	1021	n.a.	1458	n.a.
75 Ah	ABT	TM12-350W	760	n.a.	1188	n.a.	1663	n.a.	2375	n.a.
75 Ah	Effekta	BTL12-75	520	n.a.	813	n.a.	1138	n.a.	1625	n.a.
75 Ah	Enersys	12VE75	632	n.a.	988	n.a.	1383	n.a.	1975	n.a.
75 Ah	PowerSonic	PS12750GB	360	n.a.	563	n.a.	788	n.a.	1125	n.a.
78 Ah	Yuasa	NPL78-12IFR	644	n.a.	1007	n.a.	1410	n.a.	2014	n.a.
80 Ah	Effekta	BTL12-80	556	n.a.	868	n.a.	1215	n.a.	1736	n.a.
80 Ah	Fiamm	FG28009	929	n.a.	1451	n.a.	2032	n.a.	2903	n.a.
80 Ah	Sun	SB12-75FT	644	n.a.	1007	n.a.	2032	n.a.	2903	n.a.
84 Ah	Long	6FM80G/B	467	n.a.	729	n.a.	1021	n.a.	1458	n.a.
90 Ah	Effekta	BTL12-90	609	49	951	76	1332	107	1903	153
90 Ah	Enersys	12VE90	724	164	1132	257	1585	360	2264	514
90 Ah	Sun	SB12-90FT	733	173	1146	271	1604	379	2292	542
100 Ah	Effekta	BTL12-100	644	84	1007	132	1410	185	2014	264
100 Ah	Fiamm	FG2A007	982	422	1535	660	2149	924	3069	1319
100 Ah	PowerSonic	PS121000GB	662	102	1035	160	1449	224	2069	319
100 Ah	Yuasa	NPL100-12	822	262	1285	410	1799	574	2569	819
105 Ah	Long	6FM100G/B	644	84	1007	132	1410	185	2014	264
110 Ah	Sun	SB12-105FT	769	209	1201	326	1682	457	2403	653
110 Ah	Sun	SB12-100HFT	769	209	1201	326	1682	457	2403	653
120 Ah	Effekta	BTL12-120	822	262	1285	410	1799	574	2569	819
120 Ah	Fiamm	FG2C007	1071	511	1674	799	2343	1118	3347	1597
121 Ah	Long	6FM115G/B	644	84	1007	132	1410	185	2014	264
126 Ah	Long	6FM120G/B	822	262	1285	410	1799	574	2569	819
130 Ah	Yuasa	NPL130-6IFR	644	84	1007	132	1410	185	2014	264
135 Ah	Sun	SB12-125FT	964	404	1507	632	2110	885	3014	1264

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48V		Cable gauge	16 mm²		25 mm²		30 mm²		50 mm²	
		Jumper setting	50	75	50	75	50	75	50	75
C20	Brand	Type	100A	150A	100A	150A	100A	150A	100A	150A
140 Ah	Enersys	6VE140	1025	465	1601	726	2242	1017	3203	1453
150 Ah	Effekta	BTL12-150	822	262	1285	410	1799	574	2569	819
150 Ah	Fiamm	FG2F009	1160	600	1813	938	2538	1313	3625	1875
165 Ah	Sun	SB12-150FT	1000	440	1563	688	2188	963	3125	1375
180 Ah	Enersys	6VE180	1103	543	1724	849	2413	1188	3447	1697
180 Ah	Sun	SB12-180FT	1018	458	1590	715	2226	1001	3181	1431
200 Ah	Effekta	BTL12-200	822	262	1285	410	1799	574	2569	819
200 Ah	Fiamm	FG2M009	1249	689	1951	1076	2732	1507	3903	2153
200 Ah	Yuasa	NPL200-6	1071	511	1674	799	2343	1118	3347	1597
210 Ah	Long	6FM200G/B	1000	440	1563	688	2188	963	3125	1375
225 Ah	Enersys	2VE225	1117	557	1746	871	2444	1219	3492	1742

4 New batteries (IMPORTANT)

Capacity - New batteries often do not give their rated capacity when received from the manufacturer. This is due to the methods of making the plates. The plates are made by applying oxides of lead, mixed with a liquid, which generally is dilute sulphuric acid, to the grids. These oxides must be subjected to a charging current in order to produce the spongy lead and lead peroxide. After the charge, they must be discharged, and then again charged. This is necessary because not all of the oxides are changed to active material on one charge, and **repeated** charges and discharges are required to produce the maximum amount of active materials.
Some manufacturers do not charge and discharge a battery a sufficient number of times before sending it out, expecting that after a battery is put into use, its capacity eventually will increase to the specified value, because more active material is produced during each charge. Backup batteries, however, may never get enough discharge and charge cycles to reach that capacity.

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Internal resistance - It is important to recognize that due to this reduction of active material new batteries and batteries that have been stored for longer periods of time also show a relatively high internal resistance. This degradation does not recover once re-charged! Again, in order for the battery to recover, it must be discharged and charged several times. Every cycle will result in a reduction of the internal resistance.
Therefore, if you install one of these batteries and it shows a fault on the charger, this fault will not just go away by charging. The charger is not at fault, but the battery.